

Phytoplankton Biomass and Species Composition in 1997

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Chlorophyll *a* concentrations were consistently <4 µg/l in most regions of the San Francisco Bay Estuary in 1997, but reached nearly 10 µg/l in the northern delta and San Pablo Bay during the spring or fall (Figure 1). As usual, maximum chlorophyll *a* concentrations occurred in the southern delta, where concentrations were often above 20 µg/l; the maximum was 60 µg/l. The floating stations at 2 and 6 mS/cm (EZ sites 2 and 6) had low chlorophyll *a* concentrations similar to other stations in the lower Sacramento River and Suisun Bay regions, but slightly higher concentrations occurred at 2 mS/cm. Percent chlorophyll *a* concentrations above 50% at most stations suggest phytoplankton were growing well throughout the estuary, except at the 6 mS/cm floating station where percentages were consistently below 50%.

Chlorophyll *a* concentrations in 1997 were below historical levels in most regions (Lehman 1996) and may partially be the result of extremely high streamflow produced by the January flood. The low chlorophyll *a* concentrations in the Sacramento River and lower San Joaquin River regions and western, eastern, and central delta were lower than those measured in the 1970s and early 1980s. The relatively high chlorophyll *a* concentrations in the southern delta were lower than those measured in the 1970s, but well above those measured in the 1980s. In contrast, the chlorophyll *a* maxima of 8-9 µg/l in the northern delta and San Pablo Bay were among the highest values on record. Chlorophyll *a* concentrations in Suisun Bay remained below 4 µg/l, as has been common since establishment of the Asian clam, *Potamocorbula amurensis*, in 1986. High streamflow pushed clams

downstream in 1993 and enabled development of a 1-2 week increase in chlorophyll *a* concentration to 20 µg/l in Suisun Bay, but this did not appear to occur in 1997. The absence of a bloom in 1997 may be due to higher streamflow in 1997 that flushed phytoplankton downstream or to our inability to encounter blooms of short duration at our current reduced sampling frequency; sampling frequency was reduced to monthly intervals in 1995.

Chlorophyll *a* maxima varied seasonally. Spring chlorophyll *a* maxima occurred in April or May for most regions and was usually followed by additional maxima in August or September. Another chlorophyll *a* maximum in the lower Sacramento River during February was probably produced by outflow from the Yolo Bypass, because higher chlorophyll *a* concentrations were not measured in the northern delta upstream of the bypass and the bypass was flooded in February. Another anomalous peak in chlorophyll *a* concentration occurred

in November in the lower Sacramento River and western delta, but the source of this chlorophyll is unknown.

Chlorophyll maxima were associated with mixed phytoplankton communities. *Cyclotella* spp. was common in the Sacramento River stations and *Coscinodiscus* spp. was common in the San Joaquin River stations during April. Cryptomonads were also common among regions in May. Other species identified in the spring included miscellaneous flagellates, *Skeletonema potamos* and *Thalassiosira eccentrica*. There were no common phytoplankton species among stations in the fall and species identified included *Aulacoseira granulata*, *Coscinodiscus* spp., *Cryptomonas* spp., *Cyclotella* spp., *Diatoma* spp., miscellaneous flagellates and *Skeletonema potamos*.

References

Lehman, P. W. Water Quality Conditions in the Sacramento-San Joaquin Delta, 1970-1993. Dept. Water Resources, Sacramento, CA.

Zooplankton of San Francisco Bay: Report of a Pilot Monitoring Program

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Introduction

In spring 1997 IEP and the Romberg Tiburon Center began a pilot study of zooplankton in the lower estuary. The purpose of this study is to begin to extend IEP monitoring of zooplankton into the lower estuary. Until 1997 IEP had collected zooplankton in conjunction with the water quality monitoring program, sampling monthly in the delta and Suisun Bay and, during high-flow periods, in San Pablo Bay. The new program is designed to sample in San Pablo, Central, and South bays. Specific objectives are:

- To compare the zooplankton of the lower estuary with results of previous surveys conducted by USGS in 1978-81 (Ambler et al. 1985).
- To develop a sampling design suitable for long-term monitoring in this region
- To determine what species are numerically important in this region of the estuary and their spatial and temporal distribution

A previous report (Kimmerer 1997) outlined the purpose of the study, some of the background information, and preliminary results of sampling up to May 1997. It also identified some of the issues with regard to taxonomic identity of the species collected. This information is not repeated here. This report presents results since that time and discusses the results of all surveys to date.

A key requirement of the new program is that it fit into an existing monitoring program in the lower estuary. We selected the San Francisco Bay study as a suitable program with which to work, and our first broad-scale survey was during the September Bay study survey on R/V Longfin. This study showed that our sampling methods, with a few modifications, were adequate for use on Longfin with minimal disruption to the existing program. However, for efficiency we have conducted subsequent surveys on R/V Questuary. To date seven complete monthly surveys have been conducted (September to March); samples from the first two cruises only have been analyzed. In addition we have conducted the preliminary sampling discussed in Kimmerer (1997) and a transect across San Pablo Bay to examine distributions in shallow waters.

The scope of the study calls for sampling of mesozooplankton (i.e., 150 µm mesh nets) as well as macrozooplankton (mysids and amphipods) and microzooplankton. To date we have focused on the mesozooplankton for two reasons. First, we are taking large numbers of samples and would be unable to process samples from additional sampling until we determine the amount of spatial sampling necessary to characterize the mesozooplankton. Second, I plan to use the results of the mesozooplankton study to set the number and loca-

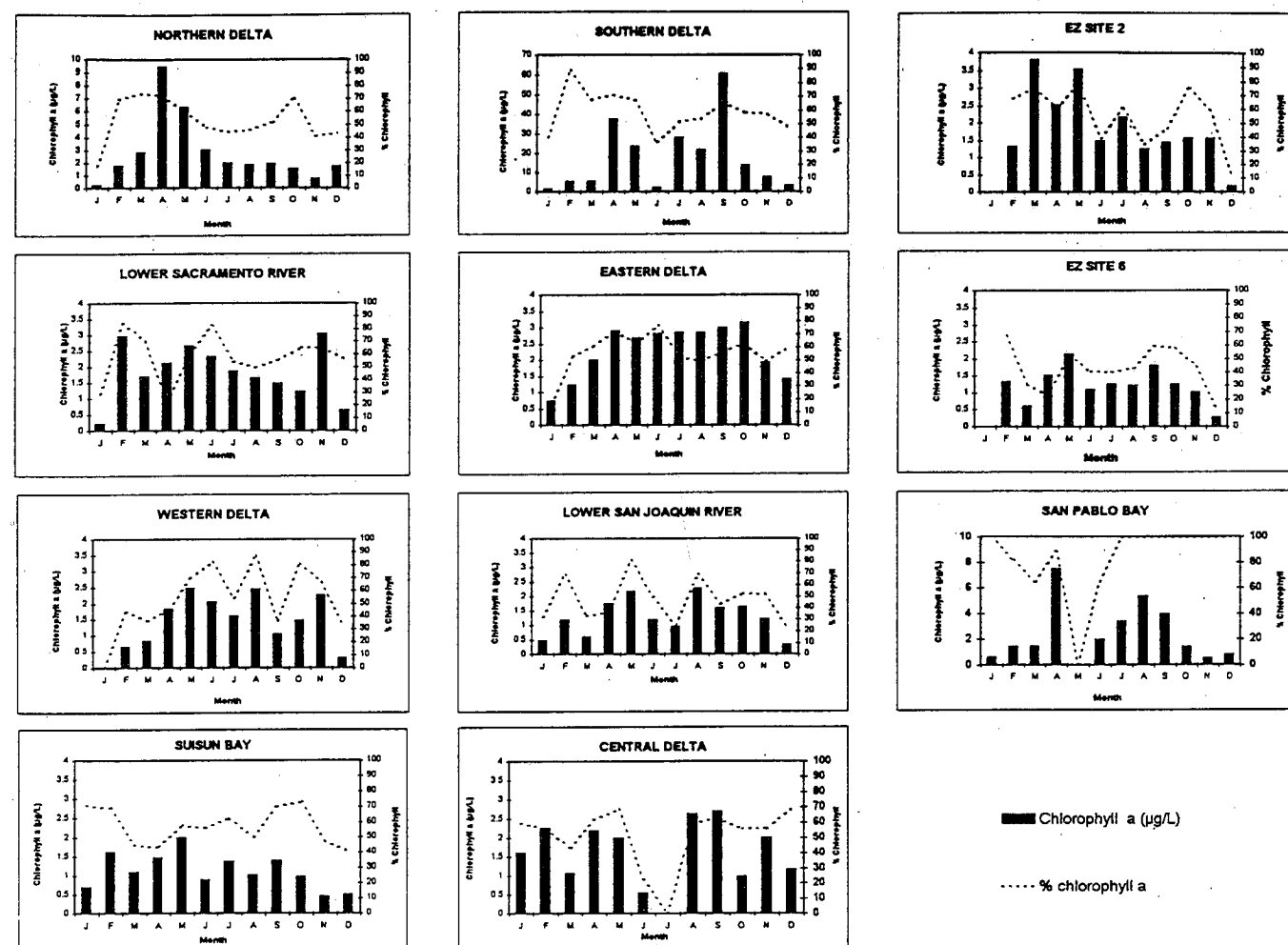


Figure 1. Changes in Chlorophyll A and Percent Chlorophyll A Concentration among Regions of the Delta and Suisun and San Pablo Bays